6. When WordStar Was King

Writing on clay was not the last word technology to drop off the screen. The market for parchment dried up in the late Middle Ages, and while papyrus continues to be sold as a souvenir in Egypt (Roemer 2007), paper has become the universal medium of choice for writing on soft and pliant surfaces, though thanks to computers those surfaces are now "hard copy." Typewriters are fast moving toward extinction, though they're not dead yet. Although the machines have become increasingly rare in the United States, typewriters are still manufactured and sold around the world. But it is hardly a stretch to claim that sooner rather than later, the people who are still typing will join the digital age and retire their machines in favor of the computer.

In fact, computers so dominate writing today that it may be difficult for the growing number of writers who have never known anything but Microsoft Word to understand that writing on screen once posed many more challenges than writing on clay. It was so difficult to write with the first digital computers that their later impact on writing would have been hard to predict. In this chapter, we will look at wordprocessing in that pre-Word era to see how a technology that was developed without writers in mind quickly came to be used more for writing than for just about anything else.

Mainframe computers have been around since the 1940s, when the U.S. Army sponsored development of the Electronic Numerical Integrator and Computer, or ENIAC, at the University of Pennsylvania, but the computer was originally designed to replace the adding machine, not the typewriter. ENIAC reduced from days and hours to mere seconds the tedious and repetitive arithmetic calculations needed to create ballistics tables for aiming artillery shells and dropping bombs, calculations previously performed by rooms full of human "computers" working mechanical comptometers.

Image 32. ENIAC replaced the human "computers" who created firing tables for the army with adding machines like the comptometers shown in this office photo. [Early Office Museum, used by permission]

ENIAC was programmed not by software but by switches and cables that had to be manually reset (Weik 1961), and the computer was so numbers-focused that it had no text entry capability at all. Some early machines permitted rudimentary text entry, but they focused their power on military and scientific calculation instead. For example, UNIVAC, developed in 1951 by Remington Rand as the first commercially-marketed computer, helped compile the U.S. Census and successfully predicted the 1952 presidential election (www.computermuseum.li/Testpage/UNIVAC-1-FullView-A.htm). But while the first Univac permitted data entry by means of an alphanumeric keyboard, it wouldn't actually accommodate word processing. Even twenty-five years later, the "interactive text editor" introduced in 1977 on the Univac 1100 was intended not for writing as such but for "symbolic data manipulation, for correction of compiler input, data preparation and performing runstream editing" (Borgerson 1977).

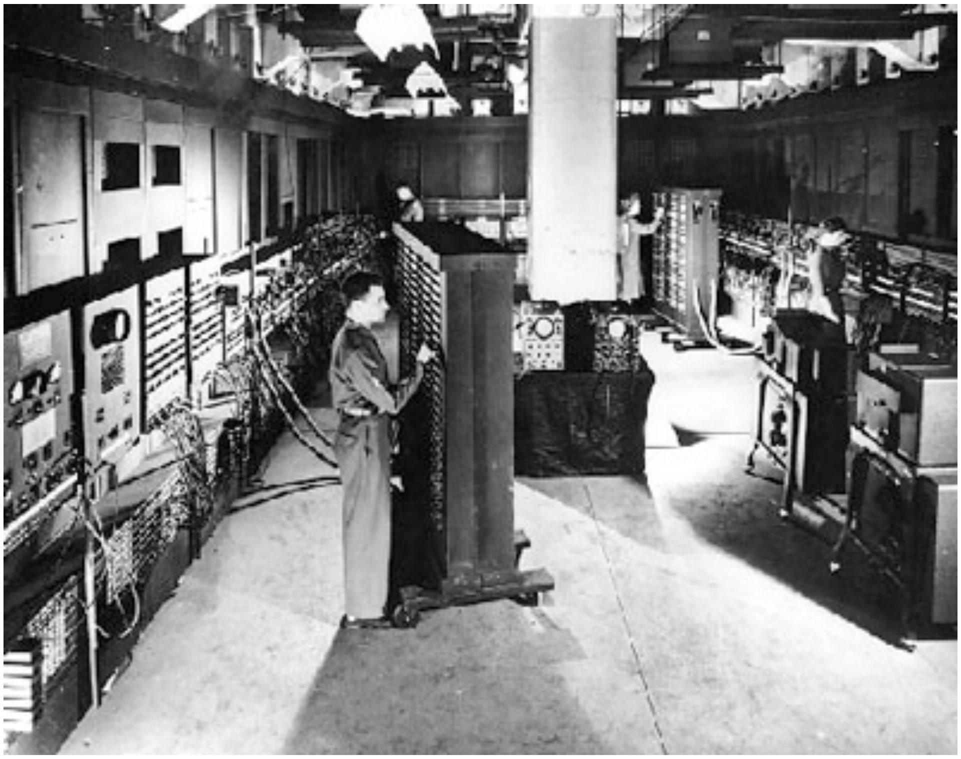


Image 33. The ENIAC, or Electronic Numerical Integrator and Computer, which went online at the University of Pennsylvania in 1946, had 19,000 vacuum tubes and cost close to half a million dollars. But so far as writing was concerned, the computer was decades behind the typewriter. [John W. Mauchly Papers, Rare Book & Manuscript Library, University of Pennsylvania. Used by permission.]

Even the personal computer, introduced in the 1980s, was intended to crunch numbers, not words. When *Time* named the PC the "machine of the year" for 1982, the magazine touted the PC as a "work processor," not a "word processor" (Friedrich 1983), and the programmers who shaped what the computer could do still preferred pencil and paper as they figured out how to run their machines.

It took some time, though only a blip in the long history of writing technologies, to be sure, for the computer to become the writer's tool of choice. Today in the United States the computer has effectively taken over most work, school, and leisure writing, but like other writing technologies, computer writing does have a history, and understanding that history will help us put the impact of the computer on reading and writing practices into the broader perspective of the five thousand year history of writing and its technologies.

As the application for the ENIAC patent makes clear, science had advanced to the point where a powerful computing machine had become a necessity (Weik 1961). What the computer's developers hadn't considered was that writing had reached that point as well. The line editors that came with ENIAC's early successors allowed for rudimentary text entry and got the attention of the more daring writers. Then WordStar, a program able to harness computing power for text creation, came on the scene in 1978, and over the next few years, growing numbers of curious and daring writers began to unplug their electric typewriters and plug in their PCs. WordStar quickly went from relative obscurity to the top of the software charts, although that program eventually lost some market share to challenger Word Perfect, which attracted its own fan club. Then came Word, in 1983, and before anyone knew it, Bill Gates got richer still and the clunky wordprocessing of the pre-Word era was wiped from our collective memory.

Anecdote: But even before WordStar, there was . . .

> When I was looking for a teaching job in 1971 there were no personal computers to help me create print-quality letters and résumés. The task of typing applications was well beyond my skill level, and paying someone to type them for me was not an option. But photocopying a letter was out of the question as well. In the employment world, hand-typed letters, ones where each keystroke left a distinct imprint on the paper, signaled a job candidate's drive, dedication and personal

character. At least, that's what every job seeker was told. Photocopies were for losers.

Luckily my problem was solved by a new machine that could mass produce an individualized-looking job letter: the word processor. The term *word processor* first appears around 1970, though machines capable of word processing – the creation, storing, editing, and printing of documents electronically – first came online in 1964, when IBM introduced a magnetic tape storage system for its Selectric typewriters. Five years later, just in time for my job search, the tape was upgraded to a magnetic card that could hold a full two-page letter, which was fine for my purposes though well below the capacity of the earliest computer floppy disks.

When the mag card Selectric typed a form letter, the typist could start and stop the operation long enough to type in a name and address, a salutation, and some personalizing details to convince the recipient that the letter had been made to order. Even though the Selectric had a light touch, it left subtle indentations in the paper. There was never any doubt that this automated letter was hand typed.

The automatic typewriter wasn't easy to master – even professional secretaries who knew their way around office machines had to be trained in its intricacies. But using the machine took me far less time than typing the individual letters myself. It was also a lot cheaper, and far less embarrassing, than paying a professional typist to copy my pathetic pleas for work, one of which eventually paid off.

> Memory typewriters, a tantalizing and expensive innovation forty years ago, are now mostly memories themselves, although Brother and Nakajima still make electronic typewriters with small display screens and the capacity to store a short letter. The mag card typewriter was a technological sidetrack: not quite the blend of typewriter and computer that would result in the PC, but a move in that direction. It adapted the typewriter to the newest demands of the American workplace. But it proved to be more than just the word-processing equivalent of eight-track tape. IBM had showed writers that electronic storage could transform the process of creating, revising, and printing their work. Today, the PC makes preparing job applications a snap, though no machine can ease the pain of dealing with the rejections every job applicant experiences.

Unfriendly mainframes

The automatic typewriter did for writers what the mainframe computer could not. Those mainframes that could handle text were not well-adapted to the task. For one thing, users could type either in caps or lower case, not both. For another, mainframe software was unforgiving. Writing on these computers daunted all but the most stubborn writers: all in all, writing with a mainframe, or even with an early PC, made writing on clay seem pretty easy.

Anecdote: A writer takes the plunge

> I was an unlikely computer writer. I'd heard of FORTRAN and COBOL but I'd never written a line of code. The only computer I'd ever seen was on "The

$64,000 Question," a TV quiz show that debuted in 1955. Each week America watched in fascination as a new contestant picked a category – boxing, or spelling, or opera – and the show's onstage computer spit out a pack of questions for host Hal March to ask. Viewers were told that the computer was selecting a group of questions at random from its memory bank. But three years into the 1950s big-money quiz show craze, it came out that the randomness was fake, that some quiz show contestants were being fed the answers in advance. The "$64,000 Question" computer turned out to be only a prop, nothing but an IBM punch card sorter whose elaborate and impressive bells and whistles were nothing but a sham.

Image 34. The "computer" shown on the set of The $64,000 Question turned out to be little more than a card sorter like the IBM 082 shown here. It could deal up to 2,000 cards per minute into twelve bins, with a thirteenth bin for rejects. Each week the faux computer "selected" questions whose answers had already been given to some of the contestants. [Columbia University Archives; used by permission]

The early popular image of the computer depicted a machine that was either hopelessly complex or, in the case of that popular quiz show, the high-tech equivalent of three-card monte, and as I came of age in the 1960s and 70s I voiced my share of skepticism about the creeping computerization of American society.

Little did I know how quickly I would become a convert to computers. I didn't wind up eating my words, but I did have to digitize them.

It was the spring of 1983, and while I still clung tenaciously to my fountain pen, for more than a decade I'd been doing all my real writing, from first draft to final product, on electric typewriters. I don't remember where or when I heard about writing with computers, but I recognized from the start that they were going to be the next tool of choice for writers.

Electric typewriters weren't particularly cheap in those days, but an IBM personal computer was an even more expensive proposition, so before investing over $6000 on what could easily have been a disastrous economic sidetrack in my personal writing history, I decided to try out writing on the university's VAX mainframe.

To facilitate my experiment, the Computer Services Office at my university loaned me a "dumb terminal" to take home for a week. It looked like a typewriter with the typing parts left out. There was a keyboard and a platen, but no type bars and no ribbon. Dumb terminals with screens were only available in the campus computer labs. Instead, my portable terminal printed text that I entered with the keyboard or downloaded from the mainframe, on a roll of thermal paper, so that I could see it.

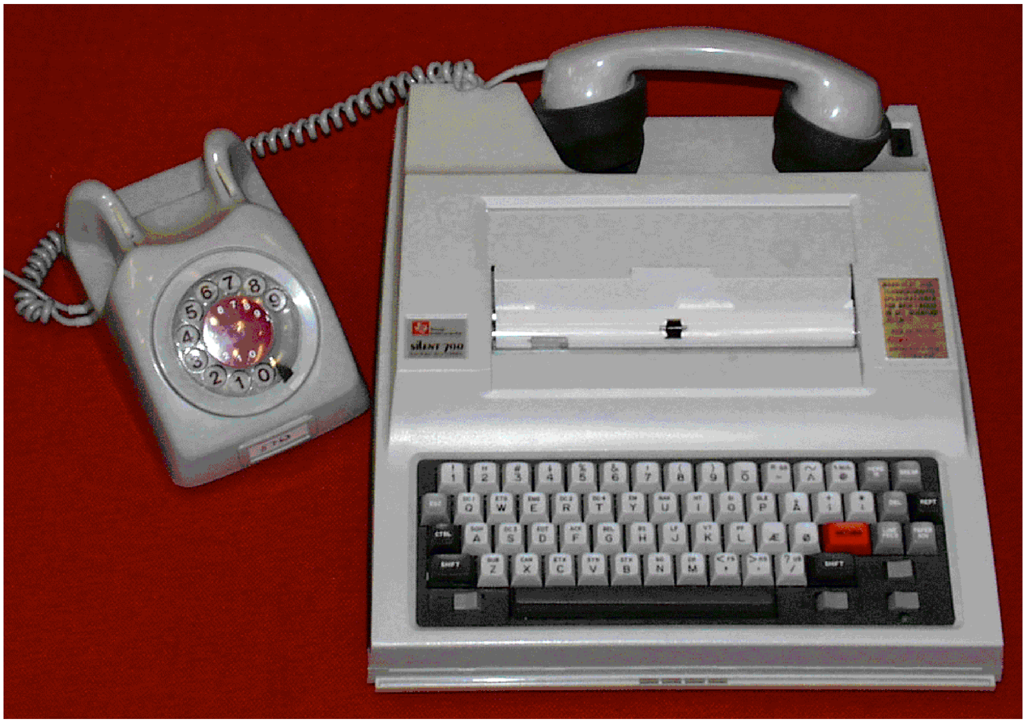


Image 35. The portable dumb terminal consisted of a keyboard, thermal printer, and an acoustic coupler, a set of cups where a telephone receiver was placed for connecting to the mainframe. [Jed Donnelley; used by permission]

These portable terminals came with a pair of rubber cups into which I placed the handset of my home telephone. If I didn't remember to disable call-waiting, the beep that signaled an incoming call would kick me off the VAX. Connecting to the mainframe was fairly straightforward – not too many people were phoning computers in those days, so the dial-in ports were never jammed. But writing on-line proved more challenging. The prospective writer had to master two thick mimeographed instruction manuals, one for writing on the VAX, the other for printing. VAX stands for Virtual Address eXtension. Knowing that made me feel part of a new community of insiders. But when I cracked the manuals, I began to realize just how much of an outsider I really was. Reading the instructions, I found myself suddenly in a land where the brand of English being spoken definitely called for subtitles.

VAX users wrote with a line editor, which worked as advertised: I could enter text one line at a time, just like I could on a typewriter. But unlike the typewriter, each line of VAX text was numbered and stored as a separate file in the computer. To edit a line after it had been stored, I had to go back and call up that specific file, and I spent a lot of time at my dumb terminal reloading lines I'd already written – sometimes guessing till I got the file number attached to the line I was looking for. I also had to remember the gist of the lines that came before and after, since the terminal's printer would only display the line I had recalled from storage. Revising involved a routine of load-edit-save; load-edit-save; load-edit-save.

Lines didn't wrap when they got too long, as they do on today's screens, and paragraphs didn't automatically reformat to account for additions and deletions. Printers in those days could only handle eighty characters per line, the number of columns on an IBM punch card, so if a line was too long, I'd have to clip words from the right margin and put them at the beginning of the next line, adjusting the paragraph line by line till I reached the end. Otherwise my prose would print out like some formless ultra-modern poem.

Visual feedback is important to writers, and I was challenged by the line editor's inability to display large chunks of what I was writing. Line editors weren't quite as bad as the first understrike typewriters, which hid the text beneath the platen and made typing an act of faith. But with the VAX I had to rely on my memory of what the text should look like, because the visual feedback available to VAX writers was extremely confusing. My keystrokes printed out on the thermal printer as I entered them, but corrections resulted in overstrikes, which made the printout unreadable. Loading lines for re-editing destroyed the continuity of the text on the printer, so I could only get a sense of the line or paragraph I was working on, not its place in the larger document.

Even when the text was reasonably clean, the output on the thermal printer was disappointing, useful only for rough drafts. For final copies I sent my first computer "job" – a 500-word book review – from my terminal at home to a printer in a campus computer lab some distance from my office. There it waited in a print queue for an unpredictable amount of time, usually a day. When it was done I could pick it up, assuming that I could locate the lab and remember the job number it had been assigned.

Each time I retrieved my "final draft" from the printer bin, I found new things in the text to correct. It eventually took me several days of entering lines, storing them, retrieving them, revising them, and reformatting them, and several trips to the lab that housed the printer, before I produced a document that I could show to my editor without embarrassment.

The horror . . .

Once I got the knack of writing from home and became reconciled to the reality that my text existed not on a piece of paper in front of me, but on some magnetic tape on a machine miles away and under someone else's control, I decided to try writing at a terminal in the computer lab. The advantage of the lab was that the terminals had monitors, so I could see my text. The lab also had an attendant who could help when the technology proved too overwhelming.

The disadvantage was that I had to write next to other people who were computing. Even though I was just working on a fairly pedestrian book review, not a great American novel, a soul-baring confessional or a deep philosophic tome, I had always considered writing a private act. Writing in the lab was anything but that. I tried not to notice the other writers, but I couldn't help myself. I certainly couldn't help noticing when the man sitting next to me jumped up from his terminal screaming, "Stop! Help! Stop!" As he watched in horror, the words he had been typing vanished from his screen, replaced by row after row of horizontal lines. Bystanders gathered around as one does at an accident, some speechless, others offering futile advice, or just staring at the twisted wreckage.

I knew, abstractly, that the electronic forces at work within the bowels of the computer could wreak havoc with a text, but this was my first real glimpse of the malevolent, implacable and nightmarish computer netherworld. In the end, though, the amazing disappearing text turned out to be just an illusion, a byproduct of the mainframe's primitive screen capabilities. The writer had marked a block of text to be underlined, and the monitor, which couldn't display both text and underlining at the same time, was doing its best to show him that the command was being carried out. A couple of clicks by the lab attendant and the text was back on the screen – it hadn't disappeared from the mainframe's memory tapes, at least not yet.

> Working with line editors was painful, but once I tasted computer writing, I wasn't eager to go back to a typewriter. Mine was more than just a fascination with the latest gadget. In fact, I found the mainframe too frustrating. But I knew after wrestling with this new technology that my writing would never be the same. My VAX experience convinced me that there had to be a better way to write, but it also convinced me that the personal computer might just be that way.

Dedicated word processors

The personal computer craze was just starting in the early 1980s, but even as the PC began to sell, there were few writers among the early converts to the machine. Mainframe computers crunched numbers, not words, and while mainframes carried the first email, it was clear they were never going to become general-purpose writing instruments. But personal computers didn't do much better in the word-processing department. Like the mainframe, these machines were meant for people in the numbers game. Those users hadn't demanded more text capability, and since most writers and typists considered computers too forbidding, PC developers saw little need to develop the text manipulation end of the business. That left room for the hybrids, dedicated word processors like the Wang 2200 and the WPS-8 that combined the stand-alone advantages of the memory typewriter with the flexibility of a computer. Xerox and CPT sold such word machines as well.

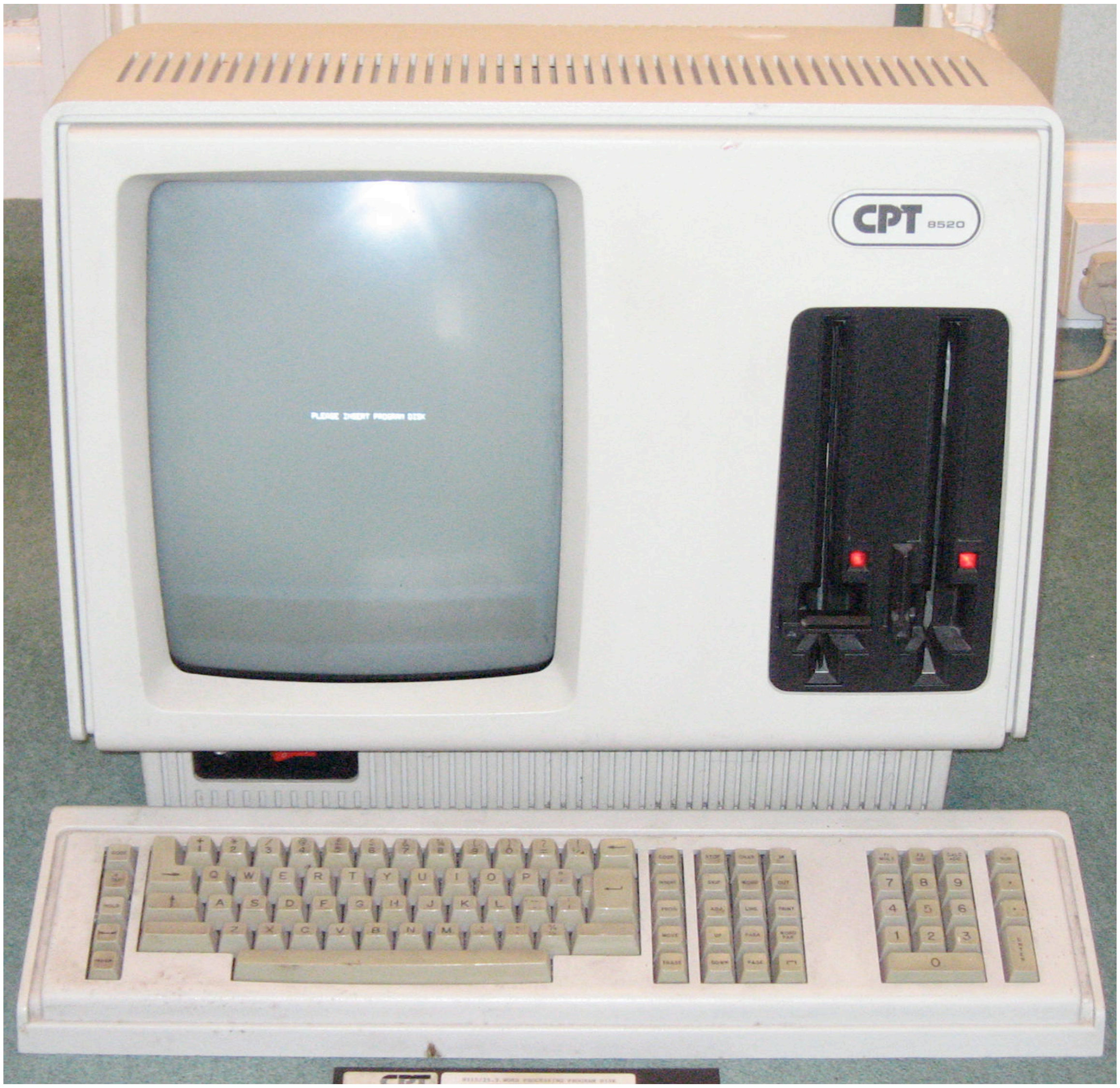


Image 36. For $20,000, the CPT 8000, a dedicated word processor, displayed a full typed page of text. It did less for more, but it did what writers wanted. [Adrian Graham, binarydinosaurs.co.uk; used by permission]

The personal computer displayed only a piece of a document at a time, twenty-four lines of type, with the IBM standard of eighty characters per line. Calling the slice of text that appeared on ordinary monitors a “screenful” or “window” fooled no one: it was only part of a page, not a whole one, not very attractive to writers and typists who came out of a centuries-old tradition where pages counted, not lines.

In contrast to the PC, dedicated word processors showed writers on-screen what they were used to seeing on their typewriters, a full typed page with black type on a white background. To further approximate the typewriter feel, some of these machines digitally mimicked other typewriter features like setting margins. The screen only displayed a single font, not the wide variety that we now enjoy, but most people used just a single font on their typewriters as well. What these word processors did offer besides the full-page display was an image of their document that looked pretty much like the final copy that came out of the printer attached to the word processor.

But these dedicated word processors were pricey – the CPT 8000 sold for $20,000, more than three times the cost of a new IBM PC or Apple. At that price, the CPT wouldn't be replacing electric typewriters anytime soon on the typical office desk, not to mention the desks of starving novelists or underpaid academics. And sharing digital documents on stand-alone word processors was limited: like the mag card Selectrics, their proprietary operating systems ensured that data could only be retrieved by other users of the same brand and model.

It's a computer industry axiom that IBM, which came to prominence as a developer of business machines and was a major player in the development of mainframes and an early marketer of PCs, seriously underestimated the potential of the personal computer. After playing catch-up for years, the company finally gave up on making PCs altogether, selling the rights to its ThinkPad laptop to the Chinese manufacturer Lenovo. Perhaps one reason why IBM failed to foresee that the PC was destined for a place on every home or office desk in America was the company's commitment to its own typewriter line, together with a conviction that writers didn't want

– or need – to change technologies. What most writers do at their desks is create or copy documents, and so far as IBM was concerned, between the pencil and the typewriter, the writers' market was all sewn up. People used computers for numbers, and numbers meant bigger and bigger mainframes, not trim, under-powered desk units. The entertainment potential of the personal computer, particularly in the area of electronic games, boosted its popularity, but factoring in such post-1982 developments as email, instant messaging, and the web, what most people now do with their PCs is process words, and while a lot of word processing still involves copying or manipulating text created by others, more and more writers are taking advantage of the new digital genres to create and publish texts of their own.

Mainframes and dedicated word processors showed those writers and computer manufacturers who cared to look a glimpse of what their future would be. Two things happened that paved the way for the personal computer to become the word processor of choice: PCs became affordable, and they became not just user-friendly, but writer-friendly as well.

The Machine of the Year

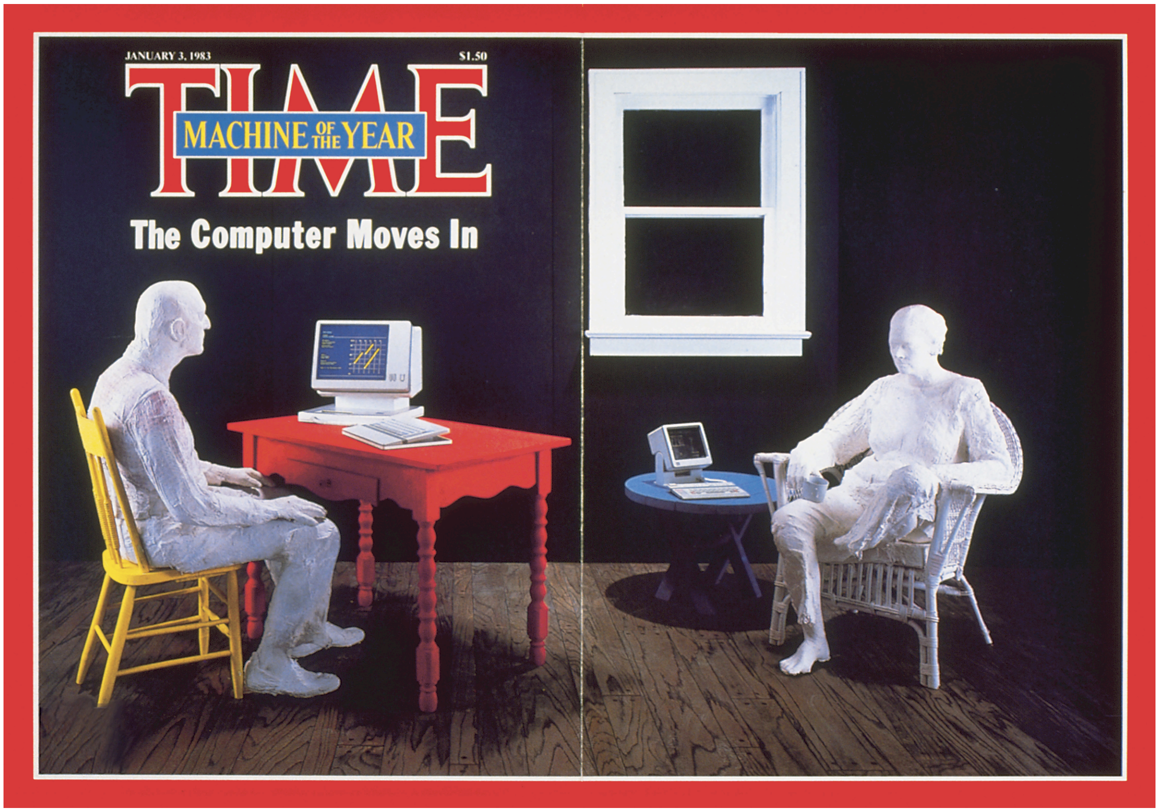


Image 37. *Time Magazine* named the computer the “machine of the year” for 1982 [image courtesy of *Time Magazine;* used by permission]

Even with its primitive word-processing capabilities, the PC was on a roll. In 1982, *Time* magazine awarded its person of the year slot to the personal computer, calling it the “machine of the year.” The cover depicted a pale, monochrome man looking toward, but not really at, a similarly-colored personal computer that sits, not on a desk, but on a small table, while the other half of the gatefold showed a barefoot woman lounging in a wicker chair and looking off into the distance, with a small desktop computer sitting on a low table off to her right. In *Time’s* graphic, the humans don’t interact with the machines. This, along with the menacing title of the cover story, “The Computer Moves In,” reinforced the popular notion that “electronic brains” were on the verge of replacing people.

As the accompanying article reported, PC sales had jumped from 724,000 in 1980 to about 2.8 million just two years later, and futurologists were lauding the PC’s role in the information revolution (Friedrich 1983). *Time* acknowledged that gaming was a big attraction for computer users, but the magazine attributed the computer’s surging popularity to its potential for education and praised the PC’s main strengths as number crunching and data manipulation. By 1982, Fortune 500 companies had already replaced ten percent of their typewriters with personal computers, but *Time* didn’t tout the computer as the next writing machine. Instead, it portrayed the PC as an *adjunct* to the typewriter that would allow writers to access and sort the information they so sorely needed. The magazine grandly predicted that the personal computer would do for the knowledge workers of the late 20th century what the assembly line had done for factory workers in the early 1900s – though it didn’t suggest that the computer would dehumanize the creation of knowledge as the assembly line had dehumanized the manufacture of goods.

In response to *Time’s* paean to the PC, most writers yawned. So far as word processing went, it turned out that the first PC’s may have been a little less unfriendly to use than mainframes, but they still presented major challenges for readers and writers. The early personal computers could not display text that looked anything like the documents writers were used to, and the machines slowed writing down and complicated it in a way that most writers were unwilling to put up with.

It was the age of color television in America, but computer monitors in the 1980s were resolutely monochrome, displaying text in one-size-fits-all, low-resolution fonts, typically green letters set against a dark background, more iron gray than black. Small changes in these displays were heralded as vast improvements. The first monitors to display orange text were greeted almost joyously as a psychological and ergonomic breakthrough, with some users claiming that orange led to a major reduction in eye strain, while others insisted that with orange their words suddenly took on a new vibrancy.

But whether the display was green or orange, the text on the screen looked neither businesslike nor literary. And as with mainframes, what users saw on their PCs bore no resemblance to the printout. On-screen text was filled with strange characters like ^B or .co that interrupted reading. These “control codes,” which told the printer how to format the raw text, interrupted writing as well, since they had to be entered manually either while composing or later, in the editing and revision stage.

Critics today fault the computer for making writing too easy. They worry that entering text has become so effortless that writers don’t bother to think about their words, that the speed of computers has led to a decline in the quality of writing. Good writers, these critics warn, need to slow down, to savor their words, to think before they write, to pause while they write, and to reflect on their writing when they’re done. Like Shakespeare, they caution, it wouldn’t hurt writers to have to sharpen a goose quill now and then.

Maybe so, but new writing technologies always start by slowing writers down. When the typewriter was developed, typists were forced to write slowly, not quickly. Type too fast and they’d jam the keys. Even when design advances alleviated this problem, the typing technology still interrupted writers at times when interruption might not be welcome: there was always paper to change, mistakes to correct, and just when it was most inconvenient, a ribbon to replace.

The demands of handwriting put a brake on our words as well, not just because writers had to sharpen their pens or correct errors, but also because they had to take pains to make their letters legible. Write too fast, and legibility loses out to sloppiness. Write too slow, and one's train of thought is lost. People often lament that they think faster than they can write, whether they write with a pen or a typewriter, and the first clay writers probably complained that dragging a stylus through what was essentially wet mud didn't do much for their own thought processes.

Computers were no different in slowing writers down. Despite the high speed we associate with digital communication, computers impeded writing even more than typewriters, clay tablets, or quill pens did. The PC's keyboard introduced extra keys to confound touch typists: the backslash \ and vertical line |, the CTRL ALT and DEL keys, the angled brackets < >, grave accent, ` and tilde ~ , not to mention the function keys, which most computer users still ignore. Unlike typewriters, computers allowed periods and commas to be entered only in lower case. Another big obstacle for those making the transition from the electric typewriter to the PC was unlearning the habit of hitting the carriage return at the end of every line.

Even after the keyboarders of the 1980s figured out where to put their fingers so they could work at a reasonable pace, they still had to slow their typing down because their personal computers simply could not process the rapid-fire keystrokes of accomplished typists. Even hunt-and-peck typists could exceed the PC's ability to keep up. Keys didn't jam when data entry was too rapid, but once the keyboard's small type-ahead memory buffer filled up, any additional keystrokes would be lost. Until these buffers were dramatically expanded, typists were routinely frustrated by loud beeps warning them that they had exceeded the machine's capacity to remember what to do.

The reluctance of writers to buy early PCs isn't surprising. Even though new technologies promise the moon, most writers – whether they are creating or simply copying text – wait for a technology to prove itself before changing how they do things. The print shop had to develop in ways that allowed it to mimic the scriptorium, creating a page that readers found familiar, trustworthy and reassuring before moving on to explore the new possibilities of mechanically reproduced words on any large scale. Typewriters too had to conquer the prejudice that machined text was not as real or direct as the handwritten word. In much the same way, writers didn't take to the personal computer in large numbers until monitors were able to display crisp black text on a white background and software allowed them to create the kinds of documents they had cut their teeth on: typed pages. The first computer writers craved what came to be called WYSIWYG – an acronym for "what you see is what you get" – with easily-formatted and highly-readable text that did what typewriters do, only better. They wanted all this, and they wanted it both cheap and easy to learn.

There were other hurdles as well. The fact that texts are stored electronically on a PC involved an act of faith: even though they could hold a disk in their hands, writers preferred their words to be visible on paper and not subject to the whims of stray magnetic fields. Writers still like to see what they write, and they know that even though paper is a fragile medium – it can burn, crumble, mildew or get lost – it's a lot easier to verify that a text exists on paper than on a magnetic disk or a TV screen.

Computer manufacturers had little initial incentive to make their machines more attractive to writers because computer operators actually scorned the idea of using their powerful number-oriented processors to reproduce mere words. Those writers who braved the clumsy technology and actually began typing messages were condemned either to the line editor or to one of the early word-processing programs. In either case, they had to deal with a system that was hard to learn, maddeningly inflexible, and diabolically slow. A writer could write more text more quickly with a Selectric, or even with a pencil.

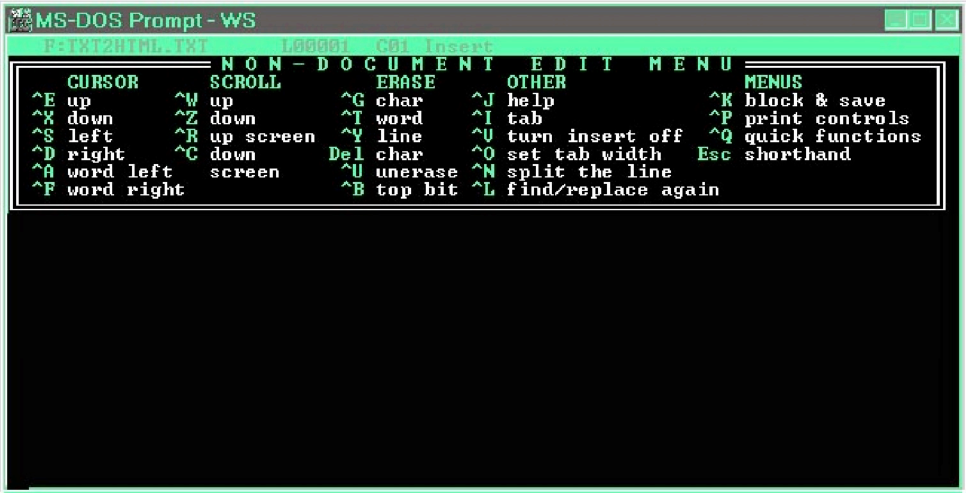
Writing on silicon, like writing on clay, slowed everything down, but more of a stumbling block was the fact that the machine constantly called attention to itself, pulling the writer away from the task of composition to attend to the demands of booting up; naming and saving files; formatting documents; making back-ups; and recovering from crashes. These details were more intrusive than having to sharpen a pencil point or change a ribbon. Plus, when a pencil crashes, it doesn't take the entire document with it.

Writing with WordStar

A look at WordStar, which was released in 1979 and soon became one of the most popular writing programs of its day, shows us what early computer writers had to put up with. At the time, writers with personal computers imagined themselves as word crunchers pushing at the frontiers of writing, but now, not twenty-five years after personal computers started flying off the shelves, we can see that programs like WordStar, WordPerfect and Volkswriter were little more than writing in slow motion.

The cluttered WordStar screen below shows that word processors, like line editors before them, were sure to take a writer's mind off content and refocus it on mechanics – not grammar and style, but the details of loading and saving files, not to mention formatting text and correcting inadvertent keystrokes. With WordStar and most other programs, the space allotted to writing – it looked like a little chalkboard – was partly taken up with lists of menu commands, and once writers entered text their words were obscured by formatting characters which displayed on screen and made reading difficult. A competing program, WordPerfect, became popular with some computer writers because its later versions allowed the extensive lists of commands to be turned off, giving writers a blank "page" to stare at (see illustrations below).

Working with text required many separate keystrokes to move the cursor, erase text, or mark blocks of words to be underlined, italicized, or relocated – there was no mouse to expedite these tasks. Word wrap, the adjustment of text so that line lengths fit within specified margins, was not automatic in the early writing programs, though it was easier to manage on these "full screen" editors than it had been with line editors. Each time text was revised, paragraphs had to be manually reformatted: in WordStar this was accomplished by typing ^B (read as "control B").



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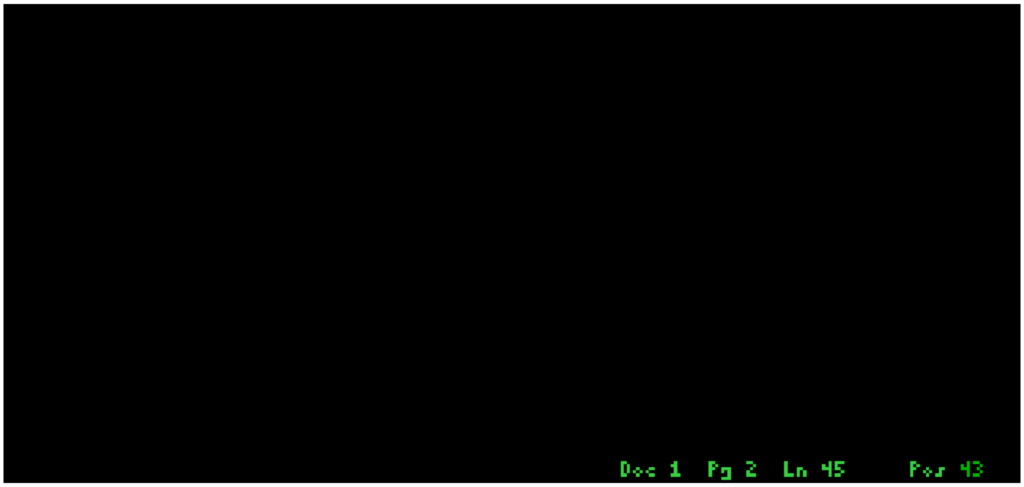
   F:TXT2HTML.TXT       L00001   C01 Insert
 ═════════════════ N O N - D O C U M E N T   E D I T   M E N U ═════════
     CURSOR          SCROLL          ERASE       OTHER                MENUS
 ^E up          ^W up           ^G char     ^J help              ^K block & save
 ^X down        ^Z down         ^T word     ^I tab               ^P print controls
 ^S left        ^R up screen    ^Y line     ^U turn insert off   ^Q quick functions
 ^D right       ^C down        Del char     ^O set tab width    Esc shorthand
 ^A word left      screen       ^U unerase  ^N split the line
 ^F word right                  ^B top bit  ^L find/replace again
```

Image 38. WordStar users wrote their documents in the program's oddly-named "Non-Document Menu," above, which offered writers a list of commands above a blank workspace for composing. Later versions of the program minimized the command list and increased the writing area. In contrast, Wordperfect 4.1 (1985), shown below, allowed writers to hide the command codes (there was, or course, a command for this, as well as one to restore the codes). WordPerfect's adherents boasted that its uncluttered screen offered more of the feel of real writing, but most serious writers didn't gravitate to word processing until monitors were able to display a white background simulating a piece of paper. [Graphic by the author]



```
Doc 1  Pg 2  Ln 45     Pos 43
```

Image 39. Word Perfect screen shot [Graphic by the author]

Complicating matters further, printed versions of documents created with software like WordStar or WordPerfect still seldom matched what writers saw on their computer screens, so page design entailed laborious trial-and-error sessions of print, reformat, reprint. While futurologists enthusiastically predicted the paperless office, computer writers found themselves cranking out page after page till they got it right, and then printing multiple copies of the final product for fear that their files would mysteriously disappear from their floppy disks like alien abductees. Often those fears of disappearing files were justified.

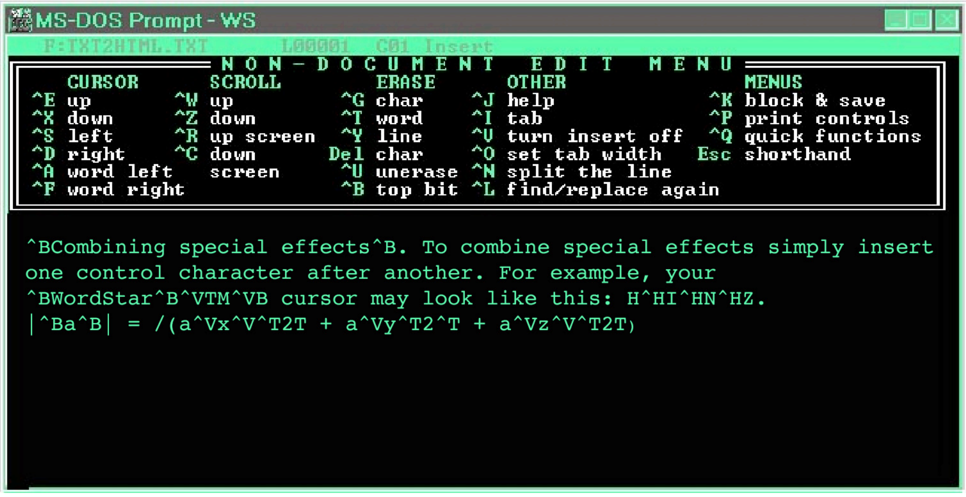
Even if the technical obstacles to word processing on a PC weren't enough to keep them away from the new technology, writers still had to come up with the funds for an entry-level personal computer, which cost up to ten times as much as a starter machine does today. Only the most determined visionaries considered computer word processing worth pursuing, and even they held on to their Selectrics and their Bics just in case.

Some WordStar commands

An early WordStar manual demonstrates the control codes for formatting a typed selection so that it will print out an illustration of the cursor and an equation, with boldface type, superscripts and subscripts. The user was first instructed to type the following text:

> ^BCombining Special Effects^B. To combine special effects, simply insert one control character after another. For example, your ^BWordStar^B^VTM^V^B cursor may look like this: H^HI^HN^HZ.
>
> |^Ba^B| = /(a^Vx^V^T2^T + a^Vy^V^T2^T + a^Vz^V^T2^T)

The typist would see this on the screen:



```
   F:TXT2HTML.TXT       L00001  C01 Insert
                  N O N - D O C U M E N T   E D I T   M E N U
    CURSOR        SCROLL           ERASE       OTHER                  MENUS
^E up         ^W up            ^G char     ^J help                ^K block & save
^X down       ^Z down          ^T word     ^I tab                 ^P print controls
^S left       ^R up screen     ^Y line     ^U turn insert off     ^Q quick functions
^D right      ^C down         Del char     ^O set tab width      Esc shorthand
^A word left     screen        ^U unerase  ^N split the line
^F word right                  ^B top bit  ^L find/replace again

^BCombining special effects^B. To combine special effects simply insert
one control character after another. For example, your
^BWordStar^B^VTM^VB cursor may look like this: H^HI^HN^HZ.
|^Ba^B| = /(a^Vx^V^T2T + a^Vy^T2^T + a^Vz^V^T2T)
```

Image 40. WordStar screens were cluttered with formatting codes [Graphic by the author]

which if done right produced a printout that looked like this:

Combining Special Effects. To combine special effects, simply insert one control character after another. For example, your **WordStar**$^{\mathrm{TM}}$ cursor may look like this: ▮ .

$|\mathbf{a}| = / (a_x^2 + a_y^2 + a_z^2)$

WordStar did permit writers to design their documents – something typewriters weren't much use for. Keyboarders could customize the size and appearance of their document by entering formatting codes. These complicated codes set such variables as margins and offsets, as well as the length of the page. They allowed the writer to include headers and footers; to change the character height and width to match the printer's capabilities; to set line spacing, tabs, and page numbering, among others.

Today the commonly-used features of word processing programs are more intuitive, or at least easier to figure out, with context-sensitive on-line help available rather than extensive print manuals. But even so, few writers take advantage of the thousands of features built into their word processors because the programs are inordinately complex and the on-line documentation often remains hard to find and far from helpful.

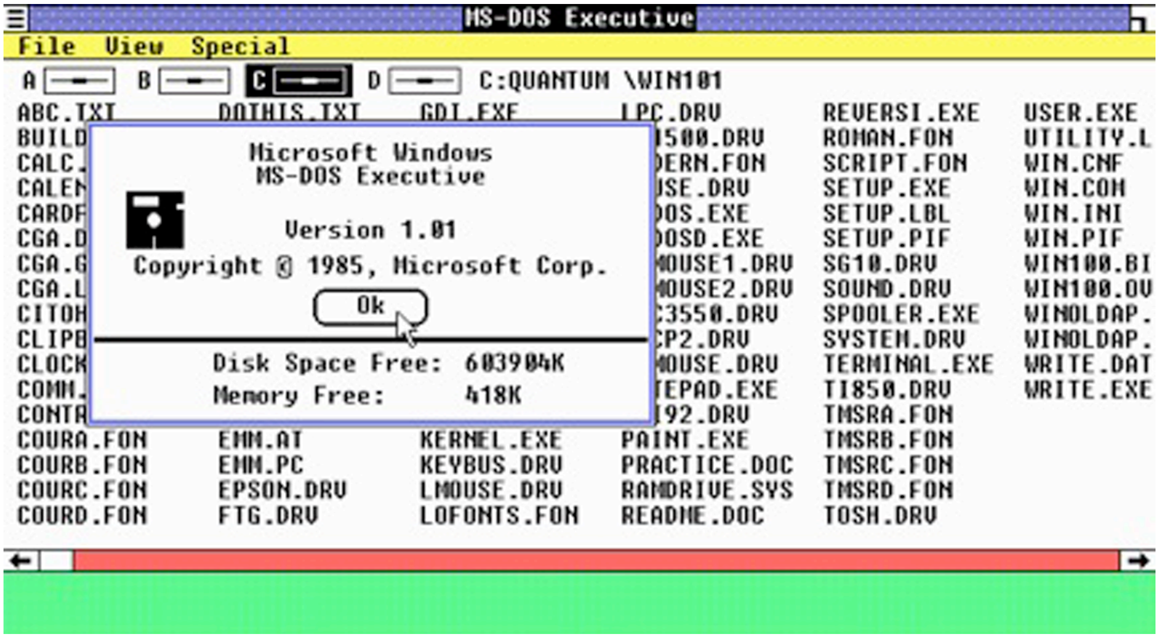
The Word Machine Comes of Age

What made it easy to ignore the computer's many shortcomings was the fact that writing with a PC offered writers something that typewriters could not: the ability to cut and paste, to revise and correct, to make change after change in the text and, extraneous codes not withstanding, still have clean copy staring back at them from the screen or better yet, from the printed page.

The ease of revision was what really made the first computer writers put up with a steep learning curve and the many false starts and instabilities that go with any new technology. But most writers didn't get in on the ground floor when it came to writing with computers. They waited till the process got easier still. It took some time before computer manufacturers realized the potential that their technology had both to improve and to complicate the lives of ordinary people who had ordinary writing tasks. But computers did improve, and ordinary people gradually joined these early adopters of the new technology to become part of the computer revolution. More than the pencil, much more than the typewriter, the computer was turning America into a nation of writers.

The GUI: Graphical User Interface

The second generation of DOS-based word processors made a giant leap toward showing writers on the screen what their printed text would look like. The improvements were modest, but they made the text easier to write and easier to read: paragraphs reformatted automatically as corrections were made; italics displayed as slanted letters, and bold text appeared brighter and thicker than plain text. As a result, a few more writers made the jump to the computer.



Microsoft Windows
MS-DOS Executive

Version 1.01
Copyright © 1985, Microsoft Corp.

Disk Space Free: 603904K
Memory Free: 418K

Image 41. Screenshot of a DOS Windows 1.01 menu from 1985 offered a list for the user to choose from. While the program did accommodate a mouse, there were few icons to click on, and most commands had to be typed. Notice too the small disk capacity and the miniscule computer memory (in kilobytes, not megabytes) compared to today's high-capacity machines. [Graphic by the author]

But what really did the trick in terms of user-friendliness was the graphical user interface, the GUI, which allowed users to work with a mouse, making their choices by pointing and clicking on icons and menus instead of entering keyboard commands that had to be memorized or looked up every time they were needed. It was the advent of the GUI that signaled the end of the typewriter industry as we knew it.

Computer graphics were nothing new. In the early 1960s, a decade before the invention of the microprocessor paved the way for personal computers, programmers began creating pictures on mainframe computers, and the first computer games followed almost at once, both on mainframes and on dedicated gaming machines like the Odyssey, introduced by Magnavox in 1966. Nor was combining words with pictures an innovation in the history of text production. Many of the first written signs were stylized pictures of real world objects, and writers have been actively merging words with pictures at least since the days of the hieroglyph. The decorated medieval charters of eleventh-century England are a perfect parallel to the computerized graphics that became all the rage a millennium later. But as with earlier technologies, the blend of text and graphics that the GUI enabled brought about innovations not just in document design, but in the kinds of documents users would create.

The first GUI's were created by Xerox at the Palo Alto Research Center in the 1970s, but they didn't spread to the world of the PC until 1983, when Apple introduced its LISA office machine, which sold for $10,000, and Microsoft offered its first Windows program (see illustration). Once the technology enabled writers to produce ordinary documents like business letters, novels, term papers and reports, ordinary writers were willing to give it a try, and the increased demand for PCs forced prices down. In addition, developments in the chip industry and advances in magnetic storage led to a dramatic increase in PC power. Manufacturers began offering newer, faster machines at such a breath-taking pace that new generations of machines came out every eighteen months, and wags quipped ruefully that a new PC was actually obsolete the moment it came out of the box. But that didn't stop sales.

As more people jumped on the bandwagon (or were forced onto the bandwagon by employers who took away their typewriters and put PCs on their desks), some of them began to exploit the computer power that drove these high-tech typewriters. It wasn't long before writers began not just typing, but designing their texts, drawing from a growing array of type fonts, another benefit of the new graphics-intensive and increasingly powerful personal computers. They inserted digitized clip art as well, or created their own pictures and later, videos and sounds, to go with what they were writing.

And these new computer writers created new kinds of writing that reflected the computer's impact on the ways we communicate: email, newsgroups, chat, instant messaging, the web page, and most recently the blog, or web log. Each of these represents a new genre, one that owes its birth directly to digital writing technology. And each of these genres has developed its own set of conventions that writers are expected to observe. Each one, too, brings with it complaints: email is destroying the language; instant messaging has taken the place of conversation; the World Wide Web is the source of lies and misinformation; and as for the blog, well who would want to read the rants and ramblings of a total stranger? Apparently lots of people: the personal computer has turned us into a nation of writers, and perhaps for the first time since the invention of writing, these writers are having no trouble finding an audience.

Nowadays, fewer people are afraid of using a computer, but many people who use a PC every day at work, in school, and at home, are still suspicious of what it can produce. Stories of digital fraud abound. Get rich quick schemes from Nigeria fill our email in-boxes. The internet thrives on pornography and phony term papers. Pedophiles and predators lurk in teen chat rooms. The government is recording every click we make. Some fears are justified, others overblown. Having learned to trust the technology, we are now engaged in the process of learning to trust the texts it produces.